

WE CLAIM:

1. A searcher for finding the frequency of a received signal comprising a phase
2 error, the searcher comprising:
a frequency locked loop that generates a phase increment signal in response to the phase
4 error of the received signal; and
a programmable rotator coupled to the frequency locked loop, the programmable rotator
6 performing a phase rotation function in response to the phase increment signal.
2. The searcher of claim 1 wherein the programmable rotator is an 8-Phase Shift
2 Keying rotator.
3. The searcher of claim 1 wherein the programmable rotator is a Quadrature Phase
2 Shift Keying rotator.
4. The searcher of claim 1 and further including a phase error accumulator coupled
2 to the phase error signal, the phase error accumulator accumulating phase error signals from the
frequency locked loop and generating a control signal that instructs the programmable rotator to
4 perform the phase rotation function.
5. The searcher of claim 4 and further including a shift register coupled between the
2 phase error accumulator and the programmable rotator, the shift register truncating a
predetermined number of bits of the control signal.

6. A searcher for finding the frequency of a received signal comprising a phase
2 error, the searcher comprising:
a frequency locked loop that generates a phase increment signal in response to the phase
4 error of the received signal;
a phase error accumulator coupled to the frequency locked loop, the phase error
6 accumulator accumulating a plurality of phase increment signals and generating a control signal
in response to the accumulated phase increment signals; and
8 an 8-Phase Shift Keying programmable rotator coupled to the phase error accumulator,
rotator performing a phase rotation function in response to the control signal.

7. The searcher of claim 6 and further including a shift register apparatus coupled
2 between the rotator and the phase error accumulator, the shift register apparatus shifting bits of
the control signal a predetermined amount in order to truncate the control signal to a
4 predetermined number of bits.

8. The searcher of claim 6 wherein the phase error accumulator accumulates phase
2 increment signals over a 64-chip interval.

9. The searcher of claim 6 wherein the frequency locked loop further comprises
2 means for generating an initial phase signal that is coupled to the 8-Phase Shift Keying
programmable rotator and initializes the rotator to a predetermined starting phase.

10. A searcher for finding the frequency of a received signal comprising a phase
2 error, the searcher comprising:

a frequency locked loop that generates a phase increment signal in response to the phase
4 error of the received signal;

a phase error accumulator coupled to the frequency locked loop, the phase error
6 accumulator accumulating a plurality of phase increment signals and generating a control signal
in response to the accumulated phase increment signals; and

8 a Quadrature Phase Shift Keying programmable rotator coupled to the phase error
accumulator, rotator performing a phase rotation function in response to the control signal.

11. The searcher of claim 10 and further including a shift register apparatus coupled
2 between the rotator and the phase error accumulator, the shift register apparatus shifting bits of
the control signal a predetermined amount in order to truncate the control signal to a
4 predetermined number of bits.

12. The searcher of claim 10 wherein the phase error accumulator accumulates phase
2 increment signals over a 64-chip interval.

13. The searcher of claim 10 wherein the frequency locked loop further comprises
2 means for generating an initial phase signal that is coupled to the Quadrature Phase Shift Keying
programmable rotator and initializes the rotator to a predetermined starting phase.

14. A searcher method for finding a signal having a frequency deviation from an
2 expected frequency, the method comprising the steps of:
initializing the searcher on predetermined frequency bins;
4 determining a phase error in the signal;
generating a phase increment in response to the phase error;

- 6 accumulating the phase increments to generate a total phase increment; and
when the total phase increment has reached a predetermined total phase increment
8 threshold, performing a phase rotation function that is substantially equivalent to the total phase
increment.

15. The method of claim 14 and further including the step of resetting the
2 accumulated phase increments after performing the phase rotation function.

16. The method of claim 14 wherein the phase rotation function is a Quadrature Phase
2 Shift Keying function.

17. The method of claim 14 wherein the phase rotation function is an 8-Phase Shift
2 Keying function.

18. The method of claim 14 wherein the total phase increment threshold is
2 substantially equivalent to $\pi/4$ radians.

19. The method of claim 14 wherein the total phase increment threshold is
2 substantially equivalent to $\pi/2$ radians.

20. A base station that communicates with wireless mobile stations, the base station
2 comprising:
a transmitter that modulates and transmits signals from a network; and

- 4 a receiver that receives and demodulates received signals, the receiver comprising a
searcher that finds the frequency of the received signal, the frequency having a phase error, the
6 searcher comprising:
a frequency locked loop that generates a phase increment signal in response to the
8 phase error of the received signal;
a phase error accumulator coupled to the frequency locked loop, the phase error
10 accumulator accumulating a plurality of phase increment signals to generate a total
accumulated phase increment, the phase error accumulator generating a control signal in
12 response to the total accumulated phase increment; and
a programmable rotator coupled to the phase error accumulator, rotator
14 performing a phase rotation function in response to the control signal.

21. The base station of claim 20 wherein the programmable rotator is a Quadrature
2 Phase Shift Keying rotator.

22. The base station of claim 20 wherein the programmable rotator is a 8-Phase Shift
2 Keying rotator.

23. The base station of claim 20 wherein the total accumulated phase increment is $\pi/4$
2 radians.

24. The base station of claim 20 wherein the total accumulated phase increment is $\pi/2$
2 radians.